

Notes on the Duration of the Pupal Stage of some Swallowtails of El Salvador (Lep.: Papilionidae)

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In the course of rearing, on several occasions since 1968, many individuals of the species *Battus polydamas* L., *Papilio thoas* L., *P. cresphontes* Cramer, and *Eurytides epidaus* Doubleday, we have determined the usual time spent by these species in the pupal stage in El Salvador.

Battus polydamas, whose larvae feed on several local Aristolochiaceae, takes from 10 to 18 days. Young reports in Costa Rica they take from 14 to 16 days (1971, *Ann. Entomol. Soc. Amer.*, **60**:595-599). *Papilio thoas*, whose larva feeds on various species of Piperaceae, not on citrics as reported by several authors, takes 16-17 days as pupa. Ross's records for Veracruz, Mexico, 10 days (1964, *Jour. Res. Lep.*, **3**(4):207-229). *Papilio cresphontes*, whose larva feed on Citrics and other Rutaceae: *Ruta graveolens* L., *Casimiroa edulis* Llave and Lexarza, takes usually 16 days. *Eurytides epidaus*, whose larva feeds on various species of Annonaceae, and whose pupa is dimorphic, being at times light green and at times light brown, takes in either case 10 days. Serrano and Serrano report two biological cycles a year (1972, *Comunicaciones*, 2a. Epoca. **1**:48-78).

These have been the normal data obtained from rearing many individuals during practically every month of the year, whether in the rainy or dry season, except for *E. epidaus*, which has been reared only during June, July and August. The rainy season in El Salvador covers the months from May to October and the dry from November to April. Yet, on some occasions, the pupal stage of these species has been unexpectedly prolonged in some individuals.

One of us (A.M.), reported a case of three pupae of *B. polydamas* out of a brood of seven, which lasted 110, 150 and 199 days respectively (1974, *J. Lepid. Soc.*, **28**:174-175).

One pupa of *P. thoas*, out of four eggs collected the same day at the same locality, spent from 4th December, 1973 to 30th April, 1974, producing a healthy male. Time elapsed as pupa was 147 days.

A good friend of ours, Victor Hellebuyck, showed us one pupa of *P. cresphontes* which lasted from 24th December, 1972 to 23rd December, 1973, when a healthy male emerged. Total time as pupa was 364 days!

During 1973 we collected nine larvae in third instar of *E. epidaus* from a single tree of *Annona purpurea* Mociño and Sessé, which pupated between the 22nd and 25th August. Five pupae did not emerge after the normal 10 days as did the other four, but were left in the pupating cage. After three months one of them was sacrificed to check if anything was wrong with it, and was found to be fresh and apparently healthy. Two months later a second pupa was dissected and again it

was found to be all right. So the remaining three individuals were left alone. All of the nine pupae were of the brown morph. On 27th February, 1974, a male emerged from one pupa that had formed on 22nd August, the pupal stage thus lasting 189 days. On 16th April, 1974, a female emerged from a pupa formed on 25th August, 1973, this after 234 days of pupation. The next day the remaining pupa produced a second female. This one also was from 25th August, 1973, and had lasted 235 days. It is worthwhile to emphasize that the nine larvae were kept at all times with fresh leaves of the same foodplant in individual plastic bags which were cleaned every day and kept under similar ambient conditions until pupation, when the pupae were transferred to a wooden cage with windows protected by mosquito-netting, until adult emergence. Ross (*loc. cit.*) mentions the results obtained by Comstock and Vazquez (*Anales Inst. Biol. Mex.*, XXXI: 339-448) with pupae of *E. epidaus tepicus* Rothschild and Jordan, which spent nine days, having pupated during August. His own experience with four individuals of *E. epidaus epidaus* (Doubleday, Westwood and Hewitson), which is the same subspecies found in El Salvador, was 201 days in pupation. He warns the reader that his specimens spent three-and-a-half months under natural conditions in Mexico and nearly three months under laboratory conditions in Louisiana, U.S.A. before the adults emerged.

According to data from the Servicio Meteorológico Nacional (1972, *Almanaque salvadoreño*) in El Salvador, temperature conditions on the shoreline (where *epidaus* is very abundant at the beginning of the rainy season) are within maximums 31.1-32.5°C. (highest being April) and minimums 21.4-24.2°C. (lowest being January). The corresponding figures for San Salvador area, where our studies have been carried out, are 29-32.5°C. and 15.9-18.8°C. It is evident from these figures that temperature is not the factor causing the reported phenomena in the four species of Papilionidae; if very low temperatures occurred, it would be understandably a state of hibernation. Is rainfall then the responsible agent? Ross (*loc. cit.*) seems to give this thought some consideration: "It is likely that the eastern subspecies *epidaus* found in Veracruz undergoes a pupal diapause through the period of heaviest rains (September-January) and emerges as an adult after drier weather begins (February-March). To be sure, half the time my pupae were under artificial conditions. However, I believe that the 3½ months diapause under natural field conditions is justification for the above suggestion."

In El Salvador the rainy season ends in October, and from November to April it is dry. So rainfall does not seem to be the explanation either, especially when other specimens reared simultaneously did perform normally, adults having emerged within the expected time limits.

We agree, with some reservations, with what F. Slansky says in his paper (as yet unpublished) on relationship of larval foodplant and voltinism pattern in temperate butterflies: "What selective forces cause the complex voltinism pattern exhibited

by a number of butterfly species in which part of a brood becomes dormant while the remainder continues normal development (Scudder, 1889)? Perhaps this may allow these species to exploit marginally favourable periods while maintaining a reserve population for the usually favourable season . . .” Our reservations arise from the fact that in our experience the dormant pupae produced the imagines precisely during the period when conditions were dry, and it happens in El Salvador that the butterfly population diminishes to a minimum towards the peak of the dry season (February-April), and starts to build up again when the rainy season is well established (July onwards).

It is our opinion Papilionidae in El Salvador (and most probably elsewhere as well) have developed the faculty of producing adults at different intervals in order to ensure the continuity of the species in case of disasters destroying the existing active population. Something like humans, their popular wisdom has come to the conclusion: do not put all your eggs in one basket!

Notes on a Colony of *Synanthedon vespiformis* L.
(Yellow-legged Clearwing) in S.E. London (N.W. Kent) with Special Reference to the Breeding Site

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Whilst examining elm trunks with flowing sap, rot holes, etc., in an avenue just off Blackheath, on 29th July 1972, I came upon a fresh example of *S. vespiformis* at rest on a large rounded excrescence on the trunk of a wych elm—the first specimen of this handsome moth and I had met with in the district. Closer inspection of the woody swelling on later visits revealed quite numerous empty pupa-cases sticking up through emergence-holes which were scattered at random over it, but not one was to be seen outside its confines on the sound wood. The following year, however, a similar but smaller, smoother excrescence on the roots, just breaking through the soil, likewise had its quota of pupa-cases. The indications were thus of a strong but very restricted colony; and the peculiar preference shown was abundantly confirmed by the fact that on no other tree in the avenue, including fairly fresh stumps, was any sign of the species to be found by close scrutiny on any of the numerous visits made, except for a few more pupa-cases protruding from each of two much smaller swellings on nearby elms—the three trees that harboured the insect being the only ones in the avenue (out of a total of some 30) seen to be cankered. That the pupae